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# (12) UK Patent Application (19) GB (11) 2 198 976 A (13)

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GB 1335868 GB 1287510 GB 1229810  
EP A1 0160835 EP A2 0154250 US 4681152  
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Note: US 4648439 and EP A2 0154250 are equivalent;  
EP A1 0160835 and US 4582119 are equivalent;

(58) Field of search  
B3F  
Selected US specifications from IPC sub-class  
B22D

## (54) Twin roll metal casting apparatus

(57) The caster has a nozzle (8) for delivering molten feedstock (10) to the gap between the rolls (2, 4) for solidification on contact with the rolls. The nozzle comprises a pair of spaced apart side plates shaped to match the curvature of the adjacent roll faces and upper and lower members connecting the side plates. One or both of the members is spaced from the outer ends of the side plates to increase the area of contact between the feedstock and the rolls; in the example shown, the lower member (21) is so arranged.

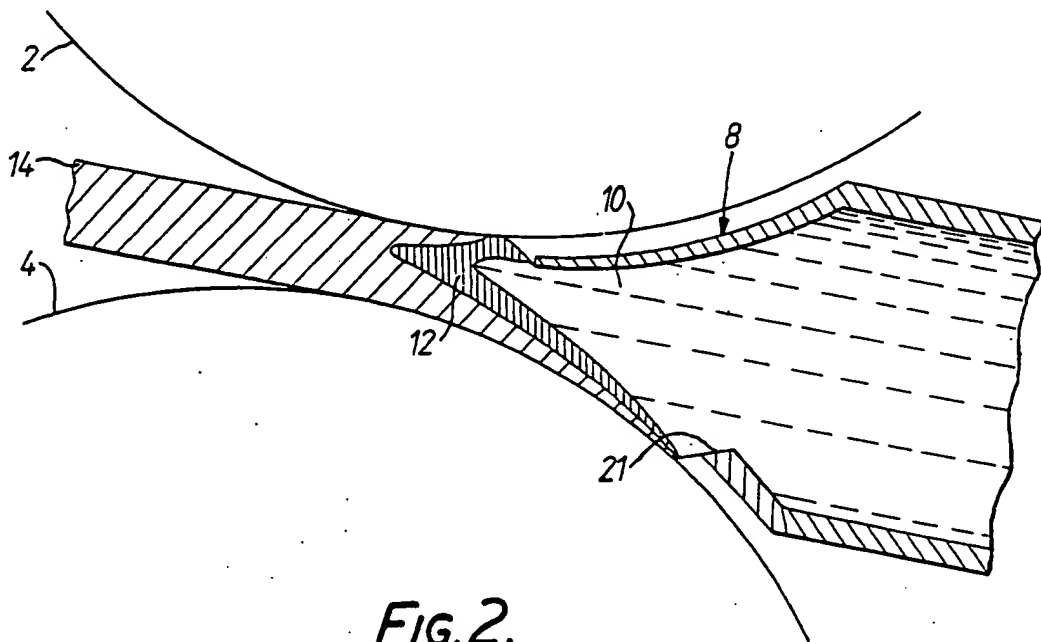


FIG.2.

The drawing(s) originally filed was (were) informal and the print here reproduced is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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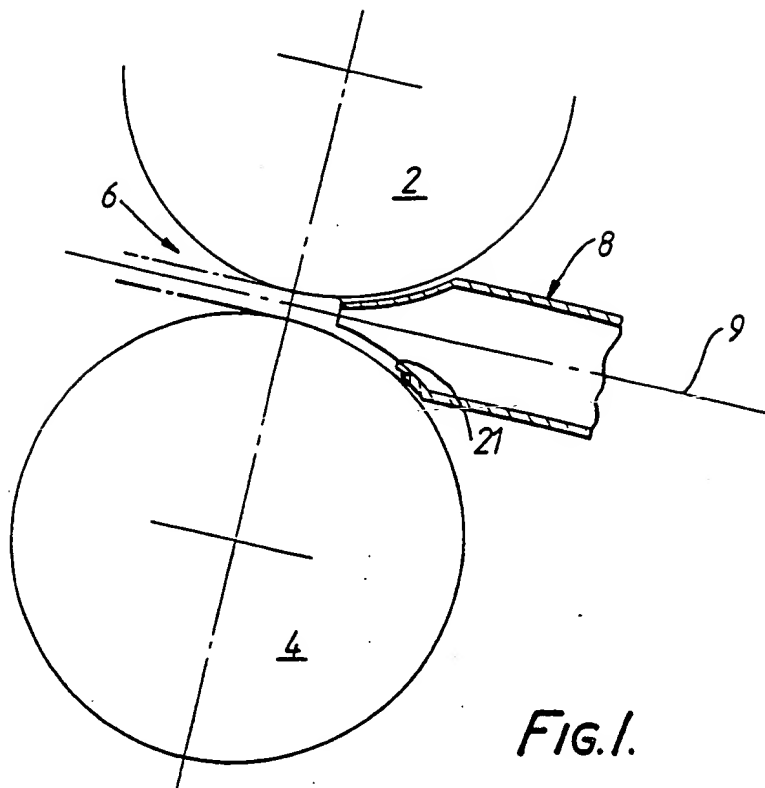


FIG. 1.

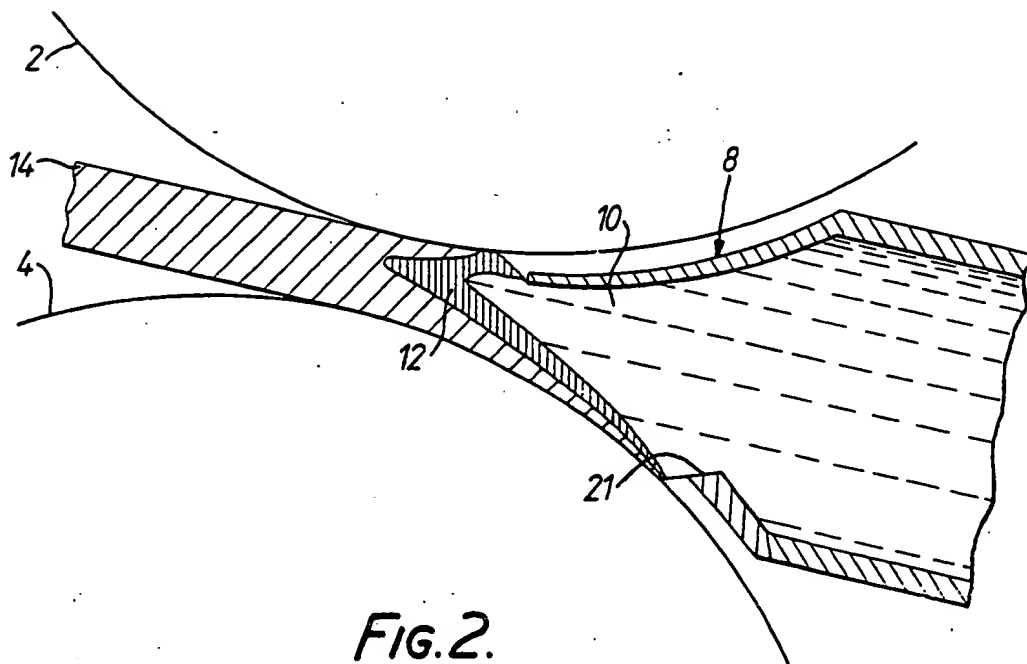
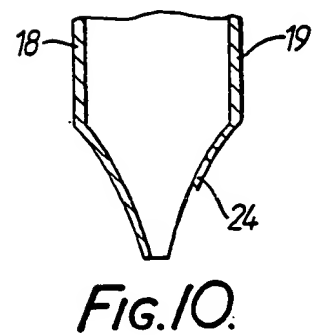
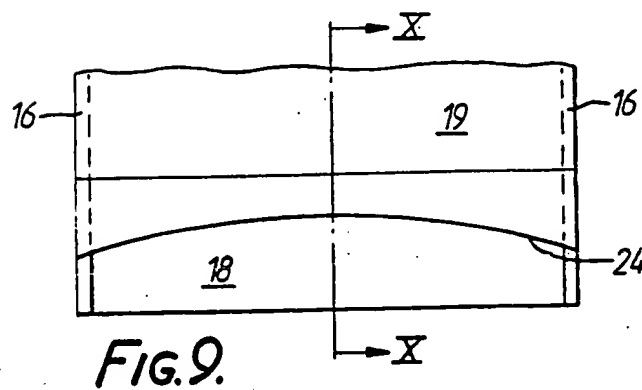
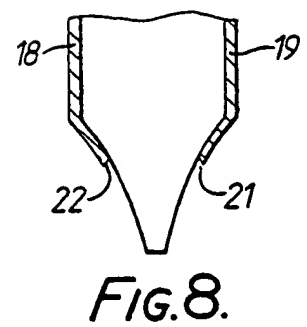
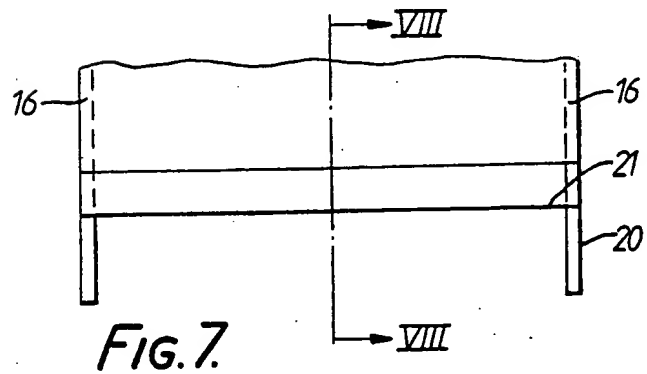
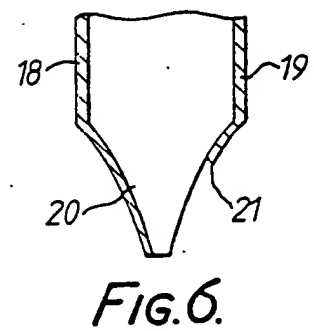
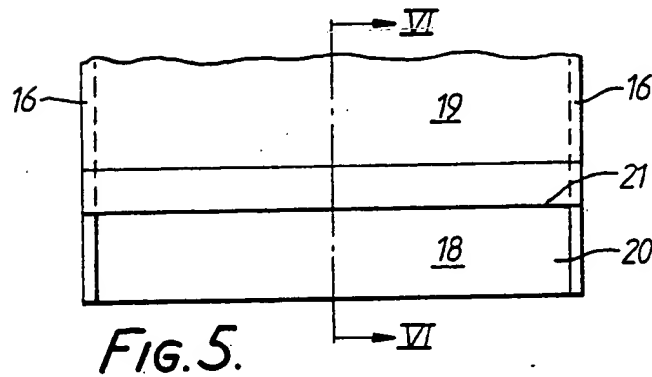
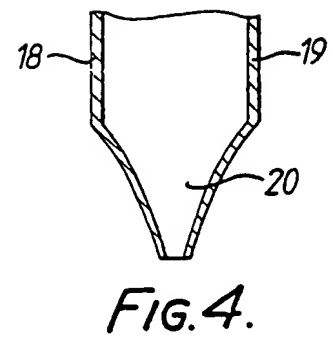
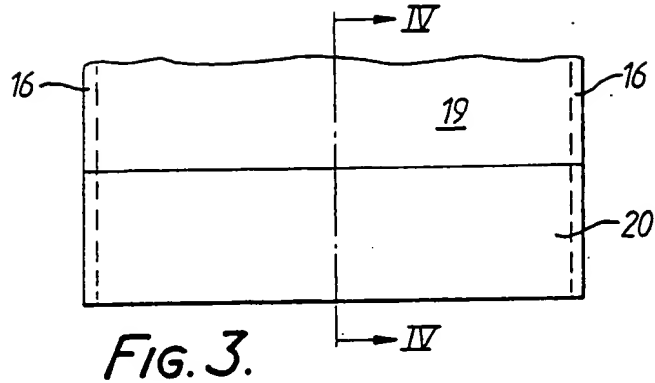


FIG. 2.

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ROLL CASTER

This invention relates to a roll caster and is particularly concerned with twin roll casters for the manufacture of cast metal sheet, for example of aluminium or various metal alloys.

The roll casting of metal sheet is already known. Molten feedstock is supplied to the gap between a pair of caster rollers where it is solidified by contact with the rolls to give a continuous sheet product. Of course the throughput of such a caster is determined by factors such as the nature of the feedstock and the efficiency with which it can be cooled in the roll gap.

The present invention seeks to provide a roll caster capable of increasing the cooling efficiency and thus enabling higher casting throughput.

According to this invention we provide a roll caster comprising a pair of rolls defining a roll gap and a nozzle which, at least when in use, extends into the gap at the ingoing side of the rolls for delivery of molten feedstock to the gap for solidification on contact with the rolls, a portion or portions of the nozzle adjacent one or both roll faces being cut away so as to increase the area of contact between the feedstock and the roll face or faces.

Preferably the roll caster is intended for the casting of aluminium and aluminum based alloys, although the invention is applicable to any feedstock material which can be cast by "freezing" from molten to solid state. The rolls are preferably provided with cooling means.

According to a preferred form of the invention the lower face of the nozzle is cut away although both upper and lower faces may be cut away. The cut away portion or portions may have a contoured shape, for example parabolic.

The invention will now be described by way of example with reference to the accompanying drawings, wherein:

Figure 1 is a diagrammatic side view of one form  
5 of roll caster in accordance with the invention;

Figure 2 is a diagram illustrating the casting process at the roll gap;

Figure 3 is a plan view of a portion of a conventional nozzle for use in a roll caster;

10 Figure 4 is a section on line IV-IV of Figure 3;

Figure 5 is a plan view of a portion of the nozzle shown in Figures 1 and 2;

Figure 6 is a section on line VI-VI of Figure 5;

15 Figure 7 is a plan view of an alternative form of nozzle tip;

Figure 8 is a section on line VIII-VIII of Figure 7;

Figure 9 is a plan view of a further alternative form of nozzle tip; and

20 Figure 10 is a section on line X-X of Figure 9.

As shown in Figures 1 and 2, a roll caster comprises an upper wall 2 and lower roll 4 defining a roll gap 6. Rolls 2 and 4 are provided with suitable cooling means (not shown). A nozzle 8 is positioned on the pass  
25 line 9 so that it extends into the roll gap. Nozzle 8 is connected to a supply of molten feedstock 10 such as aluminium or an aluminium alloy. As the feedstock emerging from the nozzle contacts the faces of the rolls 2 and 4 it solidifies, first forming a semi-solid "paste" portion 12 and finally a solid sheet 14 which leaves the  
30 caster for any suitable further processing.

Figures 3 and 4 illustrate a conventional form of nozzle comprising side portions 16 and upper and lower faces 18 and 19 which converge towards the tip 20 of the  
35 nozzle to define a rectangular opening from which emerges

a ribbon of liquid feedstock.

Figures 5 and 7 illustrate one form of nozzle as shown in Figures 1 and 2. Again the nozzle comprises side portions 16 and upper and lower faces 18 and 19. Upper face 18 is intact and converges inwardly. However, lower face 19 is cutaway at 21 so that the lower portion of the tip 20 is defined only by the lower edges of side walls 16. The result, as shown in Figure 2, is that, as the molten feedstock emerges from the tip, it has a much greater contact area with lower roll 4. Consequently the cooling efficiency is increased and casting throughput can be increased. It is believed possible to increase the casting rate by 50 to 100%.

Figures 7 and 8 illustrate an alternative form of nozzle. In this form of nozzle both lower face 19 and upper face 18 have been cutaway at 21 and 22 respectively so that tip 20 is defined only by the side walls 16. It is of course important to retain the side walls, curved at both top and bottom to match the adjacent curvature of the roll faces, so as to prevent spillage. In this embodiment even greater contact between the molten feedstock and the rolls is obtained, this time with both lower roll 4 and upper roll 2. However it will be appreciated that the contact pressure between the feedstock and the lower roll 4 is greater than that between the feedstock and upper roll 2, so that it is believed that the greater cooling effect is produced by the lower cutaway portion.

As shown in Figures 9 and 10, it is possible for the shape of the cutaway portions to be varied.

Thus the cutaway portion of nozzle lower face 19 may have a parabolic shaped edge 24. Such contouring can be employed to modify the profile of the cast strip.

## Claims:

1. A roll caster comprising a pair of rolls defining a roll gap; and a nozzle positioned at the ingoing side of the rolls for delivering molten feedstock to the gap for solidification on contact with the rolls; the outlet end of the nozzle projecting into the roll gap and comprising a pair of spaced apart side plates shaped to match the curvature of the adjacent roll faces and upper and lower members connecting the side plates; and wherein at least one of the upper and lower members is spaced from the outer ends of the side plates so as to increase the area of contact between the feedstock and the roll face or faces.

2. A roll caster as claimed in claim 1, in which the upper member extends to the outer ends of the side plates and the lower member is spaced from the outer ends of the side plates.

3. A roll caster as claimed in claim 1, in which the or each member which is spaced from the outer ends of the side plates has a curved edge adjacent the roll.

4. A roll caster as claimed in claim 3, in which the curved edge is of parabolic form.



5. A roll caster substantially as hereinbefore described with reference to Figures 1, 2 and 5 to 10 of the accompanying drawings.